

Osmosis in Plant Cell Investigation

Teacher Directions

Diploma Program Internal Assessment (Laboratory) Skills: Data Processing & Presentation, Concluding and Evaluating

This activity is suitable for use as an independent assignment, Think-Pair-Share, or group task. Student will get practice in analyzing data and presenting this analysis. They will get an opportunity for guided practice in data interpretation, and drawing supported conclusions.

Student directions

Osmosis in Plant Cell Investigation Data Analysis Task

Students in a Grade 10 science class conducted an investigation into the effect of varying the concentration of salt (NaCl) on the length of strips of celery. Celery is the stem of a plant that is commonly eaten as a vegetable. In the lab they cut pieces of celery into strips that were 10 cm in length. They removed the outer layers of strips of celery and the strips were trimmed to measure 10.0 cm with a clear plastic ruler (+/- 1mm). Ten celery strips were placed in each of five 1 L beakers. Each beaker held a solution with a different concentration of salt (NaCl). The five concentrations were: 0%, 0.5%, 1%, 2%, and 4%. After 30 minutes in the beaker the celery strips were removed and their final length was measured to the nearest 1 mm and the change in length was recorded in a data table. The raw data collected by one team of students are displayed in Table 1.

Table 1: Change in length of 10 cm celery strips after 30 minutes in solutions of either 0%, 0.5%, 1%, 2% or 4% salt (NaCl)

Length change (mm) in 0%	0.5%	1%	2%	4%
4	2	1	1	-4
3	1	0	0	-5
5	3	1	0	-4
4	0	0	0	-6
3	1	0	0	-4
4	2	1	1	-5
5	3	1	0	-5
6	2	1	1	-6
3	3	0	0	-4
4	1	1	0	-5

Osmosis in Plant Cell Investigation

1. **Calculate** the average (mean) and the range of the data for each of the concentrations of salt. Organize a data table to show these calculations.
2. **Construct** a graph of the average length change versus the concentration of salt (NaCl) for the celery sticks. Plot the range of data on the graph above and below each average.
3. The range of data represents the variability in the measurements of length taken by the students. **Comment** on the amount of variability in these data.
4. **Estimate** the concentration of salt (NaCl) that is closest to the concentration of the celery cells. Explain your reasoning.

Support material

Markschemes/marketing notes:

1. **Calculate** the average (mean) and the range of the data for each of the concentrations of salt.

Concentration	0%	0.5%	1%	2%	4%
Average change in length (mm)	4.1	1.8	0.6	0.3	-4.8
Range of change in length (mm)	3 to 6	0 to 3	0. to 1	0 to 1	-4 to -6

2. **Construct** a graph of the average length change versus the concentration of salt (NaCl) for the celery sticks. Plot the range of data on the graph above and below each average.

Osmosis in Plant Cell Investigation

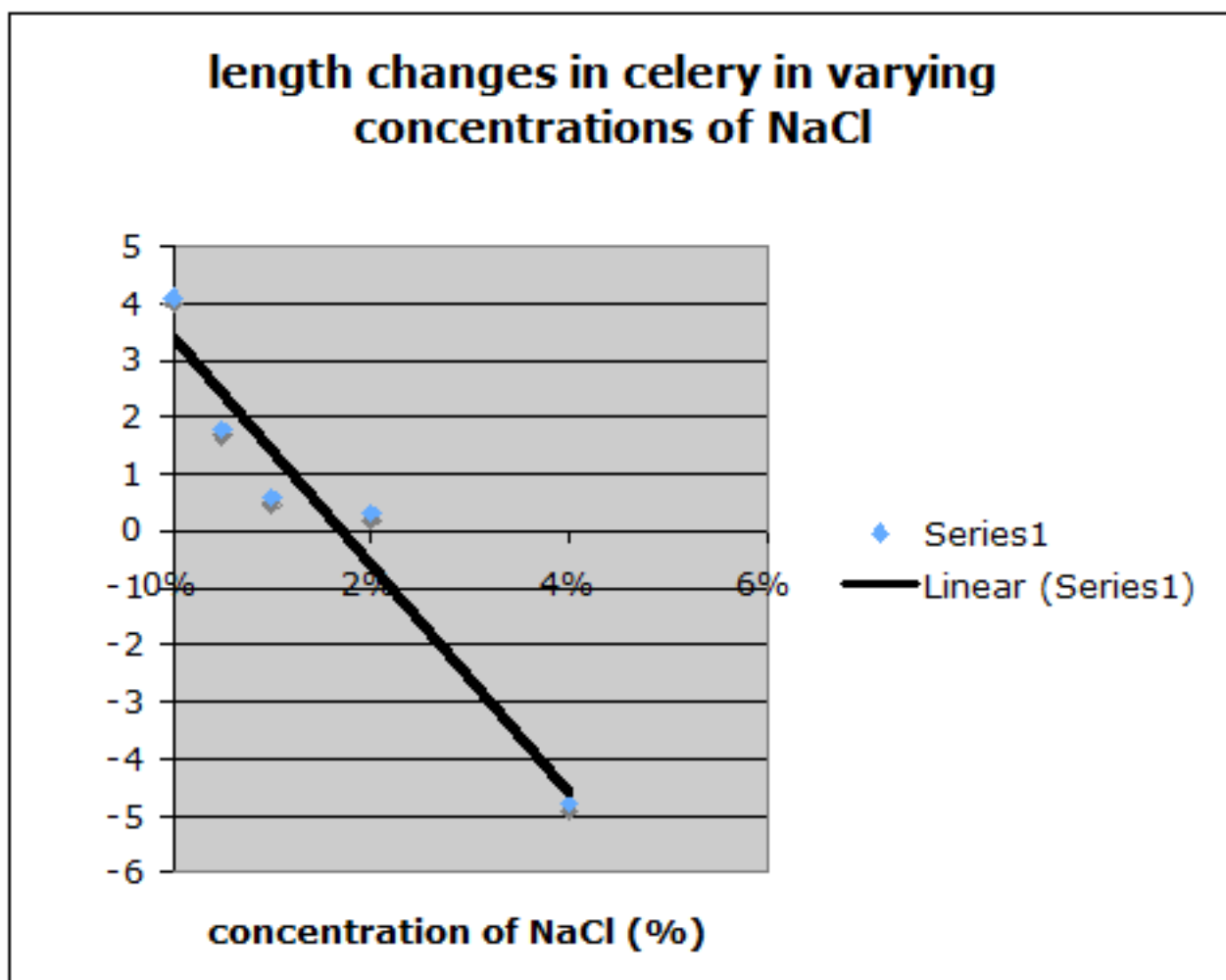
- graph should be a scatter graph where plots are points and then the high low of the range is also plotted. Students may have included a line of best fit for the average values.
- the axes should be scaled correctly to reflect that the data are continuous for both the x and y variables
- a meaningful title is expected

3. The range of data represents the variability in the measurements of length taken by the students. Comment on the amount of variability in these data.

- variability is high for the 0% and 4% solutions and very limited/less for 0.5%, 1% and 2%

4. Estimate the concentration of salt (NaCl) that is closest to the concentration of the celery cells. Explain your reasoning.

- approximately 1.8% NaCl
- one method would be to interpolate from a line of best fit on the graph, e.g.



Osmosis in Plant Cell Investigation

- other strategies that show an attempt to interpolate between 1% and 2% because there is little change in length at those concentrations showing little net gain or loss of water by the celery

Subject:

Biology

DP Component & Criteria:

B. Data Collection and processing,

C. Conclusion and evaluation

Component type:

Internal

MYP Criteria:

Group 4 / Sciences